

What is Claimed Is:

1. A regeneration device for a diesel particulate filter which traps particulates in exhaust gas discharged from a vehicle diesel engine, wherein the diesel engine outputs an engine torque through an automatic transmission to drive wheels; the regeneration device comprising:

a condition detecting sensor which detects a condition of the diesel particulate filter; and

a controller which stores a map defining a predetermined running region of a diesel engine in which self-ignition of trapped particulates is possible, the controller being programmed to:

determine whether or not regeneration of the filter is required based on the detected condition;

modify a running point of the diesel engine to a point within the predetermined running region when the regeneration of the filter is required;

set a target speed ratio of the automatic transmission based on an engine rotation speed at the modified running point; and

control a speed ratio of the automatic transmission to the target speed ratio.

2. The regeneration device as defined in Claim 1, further comprising a vehicle speed sensor which detects a vehicle speed, and

wherein the controller is programmed to read the vehicle speed from the vehicle speed sensor; modify the running point of the diesel engine to a point which lies within the predetermined running region and which maintains the vehicle speed; and set the target speed ratio of the automatic transmission based on the read vehicle speed and the engine rotation speed at the modified running point.

3. The regeneration device as defined in Claim 1, wherein the controller is programmed to control the automatic transmission to the target speed ratio by performing an upshift of the automatic transmission.

4. The regeneration device as defined in Claim 1, wherein the controller is further programmed to determine whether or not the regeneration of the filter is complete, and when the regeneration of the filter is complete, return the running point of the diesel engine to a running point prior to the modification.

5. The regeneration device as defined in Claim 1, wherein a running point prior to the modification lies outside the predetermined running region.

6. The regeneration device as defined in Claim 1, further comprising a fuel injector of the diesel engine,

wherein the controller is further programmed to control the fuel injector to perform a post-injection after controlling the speed ratio of the automatic transmission to the target speed ratio, wherein the post-injection is another fuel injection following an ordinary fuel injection.

7. The regeneration device as defined in Claim 1, further comprising a fuel injector of a diesel engine,

wherein the controller is further programmed to control the fuel injector to delay injection timing after controlling the speed ratio of the automatic transmission to the target speed ratio.

8. The regeneration device as defined in Claim 1, wherein the condition detecting sensor is a differential pressure sensor which detects a differential pressure between an inlet pressure and an outlet pressure of the filter; and

wherein the controller is further programmed to determine that regeneration of the filter is required when the differential pressure is larger than a predetermined value.

9. A regeneration device for a diesel particulate filter which traps particulates in exhaust gas discharged from a vehicle diesel engine, wherein

the diesel engine outputs an engine torque through an automatic transmission to drive wheels; the regeneration device comprising:

means for storing a map defining a predetermined running region of a diesel engine in which self-ignition of trapped particulates is possible;

means for detecting a condition of the diesel particulate filter;

means for determining whether or not regeneration of the filter is required based on the condition of the filter;

means for modifying a running point of the diesel engine to a point within the predetermined running region when the regeneration of the filter is required;

means for setting a target speed ratio of the automatic transmission based on an engine rotation speed at the modified running point; and

means for controlling a speed ratio of the automatic transmission to the target speed ratio.

10. The regeneration device as defined in Claim 9, further comprising means for detecting a vehicle speed,

wherein said means for modifying a running point comprises means for modifying the running point of the diesel engine to a point which lies within the predetermined running region and which maintains the vehicle speed,

and wherein said means for setting a target speed ratio comprises means for setting a target speed ratio of the automatic transmission based on the detected vehicle speed and the engine rotation speed at the modified running point.

11. A regeneration method for regenerating a diesel particulate filter which traps particulates in exhaust gas discharged from a vehicle diesel engine, wherein the diesel engine outputs an engine torque through an automatic transmission to drive wheels; the regeneration method comprising the steps of:

storing a map defining a predetermined running region of a diesel engine in which self-ignition of trapped particulates is possible;

- detecting a condition of the diesel particulate filter;
- determining whether or not regeneration of the filter is required based on the detected condition;
- modifying a running point of the diesel engine to a point within the predetermined running region when the regeneration of the filter is required;
- setting a target speed ratio of the automatic transmission based on an engine rotation speed at the modified running point; and
- controlling a speed ratio of the automatic transmission to the target speed ratio.

12. The regeneration device as defined in Claim 11, further comprising a step of detecting a vehicle speed,

wherein said step of modifying a running point comprises modifying the running point of the diesel engine to a point which lies within the predetermined running region and which maintains the vehicle speed,

and wherein said step of setting a target speed ratio comprises setting a target speed ratio of the automatic transmission based on the detected vehicle speed and the engine rotation speed at the modified running point.

13. A regeneration device for a diesel particulate filter which traps particulates in exhaust gas discharged from a vehicle diesel engine, wherein the diesel engine outputs an engine torque to an automatic transmission; the automatic transmission converts the engine torque to a drive torque transmitted to drive wheels; and the diesel particulate filter is installed in the diesel engine exhaust gas system; the regeneration device comprising:

- a condition detecting sensor which detects a condition of the diesel particulate filter,

- a vehicle speed sensor which detects a vehicle speed, and

- a controller which stores a map defining a predetermined running region of a diesel engine in which regeneration of the filter is possible, the controller being programmed to:

- read the vehicle speed from the vehicle speed sensor;

determine whether or not regeneration of the filter is required based on the condition of the filter detected by the condition detecting sensor;

when the regeneration of the filter is required, modify a running point of the diesel engine to a running point which maintains the vehicle speed and which lies within the predetermined running region;

set a target speed ratio of the automatic transmission based on the maintained vehicle speed and an engine rotation speed at the modified running point;

control the diesel engine to realize the engine rotation speed at the modified running point; and

control a speed ratio of the automatic transmission to the target speed ratio.